

CLAIMS

What is claimed is:

1. A lenticular lens array for creating a visual effect for an image viewed through said lenticular lens array, comprising:

a plurality of lenticules disposed adjacent to each other to form the lenticular lens array, each lenticule comprising a lenticular lens element on one side and a substantially flat surface on an opposite side,

wherein each lenticular lens element has a vertex and a cross section comprising a portion of an elliptical shape, the elliptical shape comprising a major axis disposed substantially perpendicular to the substantially flat surface of each respective lenticular lens element, and

wherein the vertex of each respective lenticular lens element lies substantially along the major axis of the elliptical shape.

2. The lenticular lens array according to Claim 1, further comprising an interlaced image printed on the flat surface of at least one of said plurality of lenticules,

wherein viewable portions of said interlaced image change as a viewing angle of said lenticular lens array changes.

3. The lenticular lens array according to Claim 1, further comprising an interlaced image printed on the flat surface of at least one of said plurality of lenticules,

wherein viewable portions of said interlaced image produce a three-dimensional visual effect when viewed through said lenticular lens array.

4. The lenticular lens array according to Claim 1, further comprising an opaque substrate, having an interlaced image printed thereon, coupled to the substantially flat surface of said plurality of lenticules,

where the interlaced image printed on said opaque substrate faces the substantially flat surface of at least one of said plurality of lenticules, and

wherein viewable portions of the interlaced image change as a viewing angle of said lenticular lens array changes.

5. The lenticular lens array according to Claim 1, further comprising a substrate coupled to the substantially flat surface of said plurality of lenticules.

6. The lenticular lens array according to Claim 5, wherein said plurality of lenticules are cast onto said substrate.

7. The lenticular lens array according to Claim 6, wherein a discontinuity exists between two adjacent lenticules.

8. The lenticular lens array according to Claim 1, further comprising a plurality of substrates coupled to the substantially flat surface of said plurality of lenticules.

9. The lenticular lens array according to Claim 8, wherein one of said plurality of substrates comprises an adhesive layer.

10. A lenticular lens array for creating a visual effect for an image viewed through said lenticular lens array, comprising:

a plurality of lenticles disposed adjacent to each other to form the lenticular lens array, each lenticle comprising a lenticular lens element on one side and a substantially flat surface on an opposite side,

wherein each lenticular lens element has a vertex and has a cross section comprising an approximated portion of an elliptical shape, the elliptical shape comprising a major axis disposed substantially perpendicular to the substantially flat surface of each respective lenticular lens element, and

wherein the vertex of each respective lenticular lens element lies substantially along the major axis of the elliptical shape.

11. The lenticular lens array according to Claim 10, wherein the approximated portion of the elliptical shape comprises:

a circular-shaped portion that approximates a circular-shaped portion of the elliptical shape; and

a plurality of substantially straight portions, each substantially straight portion approximating a portion of the elliptical shape.

12. The lenticular lens array according to Claim 10, wherein the approximated portion of the elliptical shape comprises:

a circular-shaped portion that approximates a circular-shaped portion of the elliptical shape;

a first pair of corresponding substantially straight portions separately disposed adjacent to opposite ends of the circular-shaped portion and approximating a first portion of the elliptical shape; and

a second pair of corresponding substantially straight portions separately disposed adjacent to a respective one of the first pair of substantially straight portions and approximating a second portion of the elliptical shape.

13. The lenticular lens array according to Claim 10, wherein the approximated portion of the elliptical shape comprises:

a circular-shaped portion that approximates a circular-shaped portion of the elliptical shape; and

a first substantially straight portion disposed adjacent to the circular-shaped portion and approximating a first portion of the elliptical shape.

14. The lenticular lens array according to Claim 13, wherein the approximated portion of the elliptical shape further comprises a second substantially straight portion disposed adjacent to the first substantially straight portion and approximating a second portion of the elliptical shape.

15. The lenticular lens array according to Claim 10, further comprising a substrate coupled to the substantially flat surface of said plurality of lenticules.

16. The lenticular lens array according to Claim 10, wherein the approximated portion of the elliptical shape comprises a plurality of facets each approximating a portion of the elliptical shape.

17. The lenticular lens array according to Claim 16, wherein the plurality of facets comprises a plurality of corresponding pairs of facets.

18. The lenticular lens array according to Claim 16, wherein the plurality of facets comprises:

a vertex facet disposed at the vertex of respective lenticular lens elements and positioned substantially orthogonal to the major axis of the elliptical shape; and

a plurality of corresponding pairs of facets disposed outside of said vertex facet.

19. A method for producing a tool, the tool for creating a mandrel for forming elliptically-shaped lens elements of a lenticular lens array, comprising the steps of:

providing a base member having a radius b corresponding to a minor axis of an elliptical shape, the elliptical shape corresponding to a desired elliptical shape for each lens element of the lenticular lens array; and

cutting the base member along a plane that forms an angle k with the minor axis of the desired elliptical shape,

wherein the elliptical shape comprises a major axis perpendicular to the minor axis,

wherein a vertex of the desired elliptical shape lies at a point a along the major axis, and

wherein the angle k is given by the formula $\cosine(k) = b/a$.

20. The method according to Claim 19, wherein the base member comprises a cylindrical shape.

21. The method according to Claim 19, wherein the base member comprises diamond.

22. The method according to Claim 19, wherein the radius b and the point a are adjusted from the desired elliptical shape to compensate for a protective surface that will be placed on the mandrel after being created by the tool.

23. The method according to Claim 19, wherein the base member comprises a cone shape.

24. A tool for creating a mandrel for forming pseudo elliptically-shaped lens elements of a lenticular lens array, comprising:

a circular-shaped portion that approximates a circular portion of an elliptical shape, the elliptical shape corresponding to a desired elliptical shape for each lens element of the lenticular lens array; and

a plurality of facets disposed adjacent to said circular-shaped portion, each facet approximating a portion of the elliptical shape.

25. The tool according to Claim 24, wherein said plurality of facets comprises a first pair of corresponding facets separately disposed on opposite ends of said circular-shaped portion.

26. The tool according to Claim 25, wherein said plurality of facets further comprises a second pair of corresponding facets separately disposed adjacent to a respective one of the first pair of corresponding facets.

27. The tool according to Claim 24, wherein said circular-shaped portion and said plurality of facets comprise diamond.

28. The tool according to Claim 24, wherein the elliptical shape is larger than the desired elliptical shape to compensate for a protective surface that will be placed on the mandrel after being created by said tool.